

Claims:

1. A solid sorption heat pump (1), comprising
  - 5 1.1 an adsorber/desorber unit (2) with a heat exchanger (3) and a solid sorption material (4);
  - 1.2 the adsorber/desorber unit (2) is arranged together with a condenser/evaporator unit (6) in a common housing (5) which is sealed against the ambient environment, with the adsorber/desorber unit (2) and  
10 the condenser/evaporator unit (6) being separated from one another by an adsorptive-permeable element (7), characterized by the following features:
    - 1.3 the adsorber/desorber unit (2) comprises a heat-conductive absorbent body (9) which is arranged in a heat-conductive connection with the heat exchanger (3);
    - 15 1.4 the absorbent body (9) receives the sorption material (4);
    - 1.5 the absorbent body (9) provides the adsorber/desorber unit (2) with its stability;
    - 1.6 the inner space of the common housing (5) is subjected to a negative pressure and the common housing (5) is arranged as a thin-walled sheet  
20 metal sheathing which is placed on the absorbent body (9) in such a way that the collapsing forces as produced by the negative pressure on the absorbent body (9) and/or the heat exchanger (3) and the condenser/evaporator unit (6) are carried off.
- 25 2. A solid sorption heat pump according to claim 1, characterized in that the condenser/evaporator unit (6) is arranged in the common housing (5) beneath the adsorber/desorber unit (2).
- 30 3. A solid sorption heat pump according to one of the claims 1 or 2, characterized in that the adsorptive-permeable element (7) is arranged as a vapour-permeable sponge, especially a ceramic sponge (8), which produces a predetermined distance between the adsorber/desorber unit (2)

and the condenser/evaporator unit (6).

4. A solid sorption heat pump according to one of the claims 1 to 3,  
5 characterized in that the condenser/evaporator unit (6) comprises a similar  
absorbent body (10) like the adsorber/desorber unit (2), which body is  
arranged in such a way that it receives condensation/evaporation pipes (11)  
which is flowed through by a heat transfer medium and is used for carrying  
10 off condensation heat and for supplying evaporation heat and produces the  
stability of the condenser/evaporator unit.
5. A solid sorption heat pump according to one of the claims 1 to 4,  
characterized in that the absorbent body (9, 10) as arranged as a lamellar  
construction or metal sponge.  
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6. A solid sorption heat pump according to one of the claims 4 or 5,  
characterized in that the common housing (5) is placed on the absorbent  
body (9, 10) and especially on the sections of the heat exchanger (3) and  
the condensation/evaporation pipes (11) in such a way that the collapsing  
20 forces produced by the negative pressure on the absorbent body (9, 10)  
and/or the heat exchanger (3) and the condensation/evaporation pipes (11)  
are carried off.
7. A solid sorption heat pump according to one of the claims 4 to 6,  
25 characterized in that the heat exchanger (3) and the  
condensation/evaporation pipes (11) are each arranged in form of one or  
several pipe loops, with each pipe loop comprising a plurality of horizontally  
arranged pipe sections (12) which are joined with each other at their  
horizontal ends by baffles (13) in a manner so as to guide the heat transfer  
30 medium.

8. A solid sorption heat pump according to the claims 6 and 7, characterized in that the sheet metal sheathing is placed from the outside on the baffles (13).

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9. A solid sorption heat pump according to one of the claims 1 to 8, characterized in that the supporting body (9) and/or the heat exchanger of the adsorber/desorber unit (2) is/are coated with the solid sorption material (4).

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10. A solid sorption heat pump according to one of the claims 1 to 9, characterized in that the common housing (5) is arranged as a two-shell housing whose intermediate space is filled between the shells with a pressure-force-transmitting, heat-insulating material, especially a granulate bulk material (14), and that the intermediate space between the shells is evacuated.

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11. A solid sorption heat pump (1), comprising:

11.1 an adsorber/desorber unit (2) with a heat exchanger (3) and a solid sorption material (4);

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11.2 a condenser/evaporator unit (6), with

11.3 the adsorber/desorber unit (2) comprising a heat-conductive absorbent body (9) which is arranged in a heat-conductive connection with the heat exchanger (3);

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11.4 the absorbent body (9) receiving the sorption material (4);

11.5 the absorbent body (9) providing the adsorber/desorber unit (2) with its stability;

11.6 the condenser/evaporator unit (6) comprising a heat-conductive absorbent body (10) which is arranged in such a way that that it receives condensation/evaporation pipes (11) which are flowed through by heat transfer medium and are used for carrying off condensation heat and for

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supplying evaporation heat, and providing the condenser/evaporator unit (6) with its stability;

5 11.7 the adsorber/desorber unit (2) being arranged in a first housing (5.1) sealed from the ambient environment and the condenser/evaporator unit (6) being arranged in a second housing (5.2) sealed from the ambient environment, with the inner spaces of the housings (5.1, 5.2) being subjected to a negative pressure and being joined with each other by means of at least one vapour-conducting connection;

10 11.8 the housings (5.1, 5.2) being configured as thin-walled sheet-metal sheathings which are placed on the absorbent body (9, 10) in such a way that the collapsing forces produced by the negative pressure on the absorbent body (9, 10) and/or the heat exchanger (3) and the condensation/evaporation pipes (11) are carried off.

15 12. A solid sorption heat pump according to claim 11, characterized in that the absorbent bodies (9, 10) are configured as a lamellar construction or a metal sponge.

20 13. A solid sorption heat pump according to one of the claims 11 or 12, characterized in that the heat exchanger (3) and the condensation/evaporation pipes (11) are each arranged in form of one or several pipe loops, with each pipe loop comprising a plurality of horizontally arranged pipe sections (12) which are connected with each other at their horizontal ends by baffles (13) so as to be conductive for heat transfer medium.

25 30 14. A solid sorption heat pump according to claims 12 and 13, characterized in that the sheet metal sheathings are placed from the outside on the baffles (13).

15. A solid sorption heat pump according to one of the claims 12 to 14,  
characterized in that the supporting body (9) and/or heat exchanger of the  
adsorber/desorber unit (2) is/are coated with the solid sorption material (4).
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16. A solid sorption heat pump according to one of the claims 12 to 15,  
characterized in that the housings (5.1, 5.2) are configured as double-shell
- 10 housings whose intermediate spaces between the shells are filled with a  
pressure-force-transmitting, heat-insulating material, especially a granulate  
bulk material (14), and that the intermediate spaces between the shells are  
evacuated.
17. A heating system, comprising
- 15 17.1 a heating circuit (20) which is flowed through by a heat transfer medium;  
17.2 a high-temperature source (21) which is connected to the heating circuit  
(20) for supplying heat to the heat transfer medium at a predetermined first  
temperature level;
- 20 17.3 a low-temperature source (22) which is connected to the heating circuit (20)  
for supplying heat to the heat transfer medium at a predetermined second  
temperature level which lies below the first temperature level;
- 25 17.4 a heating device (23) which is connected to the heating circuit (20) for  
removing heat from the heat transfer medium to a predetermined third  
temperature level which lies between the first and second temperature  
level;
- 17.5 a solid sorption heat pump (1) according to one of the claims 1 to 16 which  
is connected to the heating circuit (20);
- 30 17.6 a heating circuit distributor (24) and/or heating circuit valves (25) which  
is/are connected to the heating circuit (20) for the selective setting of the  
flow of the heat transfer medium through the heating circuit (20).

18. A heating system according to claim 17, characterized in that the heating circuit distributor (24) and/or the heating circuit valves (25) is/are adjustable for three switching phases:
- 5 18.1 a first switching phase, namely the desorption phase, in which a first flow circulation of the heat transfer medium is produced between the high-temperature source (21) and the adsorber/desorber unit (2) and a second flow circulation of the heat transfer medium between the condenser/evaporator unit (6) and the heating device (23);
- 10 18.2 a second switching phase, namely the adsorption phase, in which a first flow circulation of the heat transfer medium is set between the heating device (23) and the adsorber/desorber unit (2) and a second flow circulation of the heat transfer medium between the low-temperature source (22) and the condenser/evaporator unit (6);
- 15 18.3 a third switching phase, namely the by-pass phase, in which a flow circulation of the heat transfer medium is set between the high-temperature source (21) and the heating device (23).